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Received: 28 February 2022 | Revised: 11 May 2022 | Accepted: 19 May 2022

DOI: 10.1002/wcs.1611

PERSPECTIVE

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Behavior prediction requires implicit measures of stimulus-goal discrepancies and expected utilities of behavior options rather than of attitudes toward objects

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Funding information
Fonds Wetenschappelijk Onderzoek, Grant/Award Number: G073317N; Onderzoeksraad, KU Leuven, Grant/Award Number: C14/17/047

Edited by: Wayne Wu, Editor

Abstract

Meta-analyses show low correlations between implicit attitude measures and behavior measures, suggesting that these attitude measures are weak predictors of behavior. Researchers of implicit cognition have resorted to several rescue strategies. Their most important reply, based on a traditional dual-process theory of behavior causation, is that attitudes toward objects (positive/negative) automatically activate specific action tendencies (approach/avoidance), but that this stimulus-driven process can be overruled by a non-automatic goal-directed process in which the expected utilities of action options are weighed up. According to such a theory, it makes sense to continue measuring attitudes with implicit measures, but research should also take into account the moderating role of goals and other factors. We propose an alternative dual-process theory in which goal-directed processes can also be automatic and count as the most important cause of behavior. According to this theory, the goal-directed process responsible for action selection is further preceded by the detection of a stimulus-goal discrepancy. Based on this alternative theory, we propose to no longer measure attitudes toward objects but rather to measure (a) the magnitude of stimulus-goal discrepancies as well as (b) the expected utility of the behavior at stake, understood as the product of the values of the outcomes of the behavior, and the behavior-outcome expectancies. Here too, implicit measures are needed because people may not always have conscious access to these constructs or be motivated to disclose them.

This article is categorized under:

Psychology > Theory and Methods
Psychology > Emotion and Motivation
Psychology > Reasoning and Decision Making

KEYWORDS

attitude, behavior prediction, goal-directed, implicit measure, stimulus-driven

Psychologists assume that people hold attitudes toward objects, understood as positive or negative evaluations of these objects. Attitudes are supposed to cause people to behave in line with them: A positive/negative attitude toward an

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object leads to approach/avoidance of the object (Chen & Bargh, 1999). Thus, to be able to predict people's behavior, it is important to measure their attitudes. Attitudes can be explicit (e.g., conscious and/or intentionally generated), but they can also be implicit (e.g., unconscious and/or unintentionally generated). Based on the idea that people's behavior is not only caused by their explicit, but also their implicit attitudes, there is a need to measure not only their explicit attitudes, but also their implicit ones. Explicit attitudes are measured with self-report measures while implicit attitudes are measured with so-called implicit measures such as the Implicit Association Task (IAT; Greenwald et al., 1998) and the Affective Priming Task (APT; Fazio et al., 1995).[1]

Implicit measures of attitudes can be broadly defined as *indirect* measures of attitudes for which some aspect is *automatic* (De Houwer & Moors, 2007; see Corneille & Hütter, 2020, for other definitions). Brownstein et al. (2019) and Gawronski et al. (2020) remind us that implicit measures are *direct* measures of behavior and *indirect* measures of attitudes at best. They are direct measures of the behavior during measurement in that the speed and/or accuracy of the participant's responses is taken as a direct read-out of the speed and/or accuracy of these responses. They are indirect measures of attitudes in that differences in speed and/or accuracy between different conditions are interpreted by the researchers as caused by different attitudes (De Houwer & Moors, 2010). The validity of indirect measures hinges on the validity of the assumption that these patterns of response times and/or errors are indeed caused by attitudes.

Attitude measures are implicit to the extent that some of the processes underlying the measurement are automatic in one sense or another (i.e., they occur under poor operating conditions such as a lack of time, attention, and the intention to engage in the process, they are unconscious, and/or they are difficult to counteract; Moors, 2016). Performance on attitude measurement tasks relies on two processes: (a) an evaluation process, which takes an object as its input and produces an attitude as its output and (b) a translation process through which the attitude influences the measurement score (Moors et al., 2010). Authors vary in the entity that they require to be automatic for a measure to qualify as implicit (Gawronski et al., 2020; Moors et al., 2010). For some, this has to be the evaluation process. As such, they are loyal to the initial ambition to develop a measure that taps into implicit attitudes. Others adopt a weaker position in that they only require the translation process to be automatic. According to them, implicit measures may tap into explicit attitudes but the person does not have insight in or control over this fact. Determining the automaticity of evaluation and/or translation processes can to some extent be inferred from procedural features (e.g., the processes involved in speeded response tasks are likely fast), but ideally this should be established in empirical research (e.g., to determine whether a process is efficient, the available attentional resources should be manipulated). The in/directness of a measure, on the other hand, can be established a priori, which is why several authors have replaced talk of implicit measures by talk of indirect measures (Greenwald et al., 2021; Machery, 2021).

Apart from debating what is implicit about implicit attitude measures, researchers have debated about the nature of the evaluation process (De Houwer et al., 2020; Gawronski & Bodenhausen, 2006; Kurdi & Dunham, 2020; Schwarz, 2007) and the translation process (Eder et al., 2012). Another issue of debate, and the topic of the present commentary, is whether implicit attitudes do indeed cause behavior, as was initially assumed, and if so, whether they do so in a different way than explicit attitudes. If it can be confirmed that implicit attitudes have a unique influence on behavior, measuring these attitudes will help us improve our predictions about how individuals will behave.

To examine whether implicit attitudes cause behavior, researchers have started by calculating correlations between measures of implicit attitudes (i.e., the predictors) and measures of behaviors (i.e., the criteria). Meta-analyses and narrative reviews, however, have shown that these correlations are low (Cameron et al., 2012; Friese et al., 2008; Greenwald et al., 2009; Kurdi et al., 2019; Oswald et al., 2013; Perugini et al., 2010). To study the causal role of implicit attitudes on behavior more directly, several researchers have turned to an interventionist strategy, in which they examined whether the manipulation of implicit attitudes (using various methods) led to a change in behavior. In a recent meta-analysis of such intervention studies, Forscher et al. (2019) reported that although several manipulations led to a change in behavior, there was no evidence that implicit measures mediated these effects.

The lack of predictive validity of implicit measures for behavior has led critics to challenge the usefulness of these measures (Machery, 2021; Mitchell & Tetlock, 2017). If implicit measures do not predict behavior, are they worth our time and effort, or should we get over the hype and abandon studying them? Some critics conclude that if implicit attitudes exist at all, they are causally inert. They are nothing but epiphenomena, like a residue or scar (Forscher et al., 2019).

Defenders of the implicit research program, on the other hand, have resorted to various rescue strategies. A first strategy has been to argue that implicit attitudes do influence behavior in experiments (Kurdi et al., 2019). Indirect methods such as the APT have not only been used to assess individual differences, but also to demonstrate that stimulus evaluation can be automatic. Affective priming effects rely not only on the occurrence of an evaluation process, but

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also on a translation process by which the output of the evaluation influences the behavior in predictable ways. Thus, implicit attitudes are not causally inert per se. The effects obtained in this research, however, rely on averages across participants and may not help in predicting the behavior of individuals. Some authors are happy to concede this and content themselves with the fact that implicit attitude measures can predict the behavior of groups in a reliable way (e.g., Payne et al.'s, 2017, bias-of-crowds model). This is based on the idea that low correlations can potentially accumulate across participants, ending up in sizeable societal impact (Greenwald et al., 2015).

A second strategy is to argue that low correlations occur because of methodological weaknesses that can potentially be remedied. Some weaknesses concern the implicit attitude measures, such as the low temporal stability of these measure (Gawronski et al., 2020) and the fact that they are influenced by processes of recoding (Meissner et al., 2019). The first weakness can be solved by aggregating data from multiple administrations of an implicit measure over time (Greenwald et al., 2021) and the second by developing procedural and data-analytic methods to control for recoding. Other weaknesses concern the correspondence between attitude measures and behavior measures. If this correspondence increases, correlations should increase as well (Ajzen & Fishbein, 1977). Correspondence can be considered in terms of *content*. For instance, an implicit measure of the attitude toward fruit may be more poorly correlated with eating bananas than an implicit measure of the attitude toward bananas (Irving & Smith, 2020). But correspondence can also be considered in terms of the *context* in which the attitude and the behavior are being measured (Gawronski et al., 2020). For instance, correlations may be stronger when the attitude and the behavior toward Black people is measured in the same context (e.g., sports context) than in a different context (e.g., attitude in sports context, behavior in hiring context). One part of the context is constituted by the operating conditions that are available in it. Accordingly, correlations should be stronger between implicit attitude measures and spontaneous behavior and between explicit measures and deliberate behavior. This is because the conditions created by implicit/explicit methods for measuring attitudes are similar to those created by methods for measuring spontaneous/deliberate behavior.

A third strategy has been to argue that low correlations are observed because theoretical constraints have been overlooked (e.g., Brownstein et al., 2019, 2020; Perugini et al., 2010). The idea is that implicit attitudes do predict behavior, but only under certain conditions. Based on theoretical grounds, one would expect a number of moderators to influence the relation between attitudes and behavior. Hence, low but positive correlations, which are in fact found, are to be expected. If Homer likes beer, this does not mean that he will always drink beer. He might not drink beer at breakfast, when he's on a diet, when he just brushed his teeth, when he drives his car, and so on (Brownstein, 2018). This suggests that the relation between attitudes and behavior is moderated by other factors, such as the goals and activities that Homer happens to be engaged in and the goal to regulate his impulse to drink beer.

Although we welcome a theory-driven approach, we challenge the traditional dual-process theory of behavior causation that has guided implicit cognition research so far. This theory distinguishes between (a) a stimulus-driven process in which a stimulus activates the association between the representation of stimulus features and the representation of a response (see Figure 1a) and (b) a goal-directed process in which the expected utilities of one or more behavior options are processed before an action tendency is activated.

The traditional dual-process theory has a default-interventionist architecture in which the stimulus-driven process is automatic and therefore the default determinant of behavior whereas goal-directed processes are nonautomatic so that they can only intervene when operating conditions are ample (e.g., Strack & Deutsch, 2004). Many attitude researchers seem to subscribe to a default-interventionist version of dual-process theory: An attitude, which can be considered as the representation of a stimulus feature (i.e., valence: positive/negative), is directly connected to the representation of a response (e.g., approach/avoidance; Neumann et al., 2003; Todd et al., 2011). This stimulus-driven process can be overruled by a goal-directed process but only when operating conditions are ample. Implicit measures are supposed to tap (mostly) into the stimulus-driven process, and explicit measures (mostly) in the goal-directed process.

We propose to follow an alternative dual-process theory with a parallel-competitive architecture (Moors et al., 2017). The theory assumes that stimulus-driven and goal-directed processes can both be automatic, which implies that they will often operate in parallel and enter into competition. The theory further assumes that the goal-directed process should win this competition because this process is more likely to lead to optimal behavior. On this view, the goal-directed process determines the lion share of behavior whereas the stimulus-driven process determines behavior only in exceptional cases. The alternative theory, moreover, embeds the narrow goal-directed process involved in action selection in a cycle in which it is preceded by the detection of stimulus-goal discrepancies. In a nutshell, the goal-directed cycle at the service of one goal comprises the following steps (see Figure 1b): (a) detection of a discrepancy between this first goal (i.e., representation of a valued outcome) and the representation of a current or anticipated

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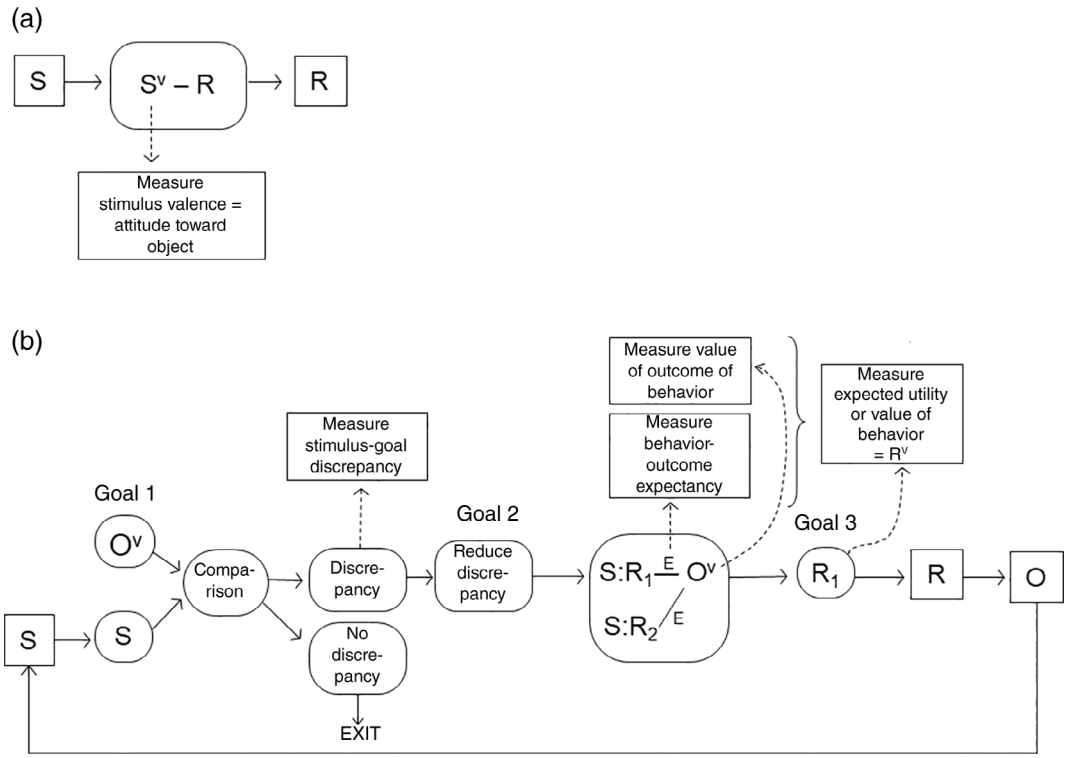


FIGURE 1 (a) Stimulus-driven and (b) goal-directed processes and the constructs to be measured according to the (a) traditional and (b) alternative dual-process theories. Squared boxes depict observable entities; rounded boxes depict non-observable, mental entities. (a) Stimulus-driven process in which a stimulus (S) activates the association between the representation of a stimulus or stimulus feature (in this case valence: S^v) and the representation of a response or action tendency (R), leading to an overt response. Since the traditional dual-process model takes this process as the main determinant of behavior, the to-be-measured construct here is stimulus valence or the attitude toward the object. (b) Goal-directed cycle in which a discrepancy detection phase is followed by an action selection phase. Since the alternative dual-process model takes this process as the main determinant of behavior, the to-be-measured constructs here are stimulus-goal discrepancy, outcome value (O^v), and behavior-outcome expectancy (E). The expected utility or value of behavior (R^v) can also be measured as a short-cut for the latter two. Adapted from Moors et al. (2019).

stimulus, (b) activation of a second goal to reduce the discrepancy, (c) selection of an overt or covert action option based on the expected utilities of the available options, (d) activation of the corresponding action tendency or intention, which is a third goal, (e) execution of the overt or covert action, and (f) occurrence of the actual outcome of the action. This outcome is again fed back to the cycle as the new stimulus.

From the perspective of the traditional dual-process theory, which assumes that most behavior is determined by a stimulus-driven process, it makes sense to continue measuring attitudes (see Figure 1a), especially with implicit measures because they allow bypassing the regulatory attempts of goal-directed processes. From the perspective of the alternative dual process theory, however, which assumes that most behavior is determined by a goal-directed process, it makes more sense to measure (a) the magnitude of stimulus-goal discrepancies as well as (b) the expected utility of the behavior at stake, understood as the product of the values of the outcomes of the behavior, and the behavior-outcome expectancies (see Figure 1b).[2] Here too, implicit measures are needed because people may not always be aware of these constructs or be motivated to disclose them.

In our lab, we have taken the first steps to design implicit measures that can assess these constructs, taking advantage of the IAT (Greenwald et al., 1998), designed to measure associations (i.e., unqualified relations) between concepts, and the Relational Responding Task[3] (RRT; De Houwer et al., 2015), designed to measure propositions (i.e., qualified relations) and the extent to which people believe them. To illustrate, to predict whether an individual will engage in subtle discriminatory behavior such as avoiding Black people, the best strategy may not be to measure whether they like Black people but rather to identify the goals or desired outcomes that might be driving their behavior in the presence of Black people (e.g., goal for safety, goal to connect) and then to measure the individual's assessments of (a) the extent to which a stimulus is discrepant with these outcomes, (b) the values of these outcomes, and (c) the expectancies

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that various behaviors (e.g., avoidance, approach) will lead to these outcomes. Measuring whether an individual considers the presence of a Black person as discrepant with their goal for safety can be done with an RRT that measures the degree to which they believe Black people are dangerous. Measuring the values of outcomes can be done with an IAT that measures the association between outcomes (e.g., safety, connection) and positive/negative valence. Measuring behavior-outcome expectancies can be done with an IAT that measures the association between behaviors (e.g., approach, avoidance) and outcomes (e.g., safety, connection) or with an RRT that measures the degree to which participants believe that certain behaviors will cause certain outcomes. To measure the expectancies of a single behavior for multiple outcomes at once, we can make use of a variant of the Implicit Attribute Classification Task[4] (IMPACT; Altenburg & Spruyt, 2022). For instance, we can measure the extent to which participants associate certain behaviors (approach, avoidance) with certain outcomes (safety, connection). Another option that would fit with the alternative dual-process theory would be to measure the values or attitudes toward behaviors instead of toward objects. The idea here is that the value of a behavior corresponds to the expected utility of the behavior, which is the product of the behavior's outcome values and behavior-outcome expectancies. Thus, measuring the value of a behavior can be considered as a short-cut.[5]

In sum, while implicit attitude researchers inspired by traditional dual-process theories try to improve the predictive validity of implicit attitude measures by searching for moderators of the attitude-behavior relation, we propose that attitudes toward objects may not be the prime determinant of behavior to begin with and hence that this approach may eventually be fruitless. Inspired by the alternative dual-process theory of Moors et al. (2017), we propose instead to develop implicit measures of goal-directed constructs such as stimulus-goal discrepancies, outcome values, and behavior-outcome expectancies. Given that the conditions created by implicit methods are similar to those created by methods for measuring spontaneous behavior, implicit measures of goal-directed constructs may be especially suitable for (even if not limited to) the prediction of spontaneous behavior.

AUTHOR CONTRIBUTIONS

Agnes Moors: Conceptualization (lead); funding acquisition (lead); visualization (lead); writing – original draft (lead); writing – review and editing (lead). **Massimo Köster:** Writing – review and editing (supporting).

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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ENDNOTES

[1] In the IAT, participants sort objects—for example, White and Black faces—and attributes—for example, positive and negative words—by pressing a right or left key. If a participant responds faster and/or more accurately when the key for White/Black faces is the same as for positive/negative words than when the key for White/Black faces is the same as for negative/positive words, it is inferred that this participant holds a stronger association between White and positive and between Black and negative than for the reversed combinations and hence has a positive/negative attitude toward White/Black people. In the APT, participants respond to positive/negative target stimuli (positive and negative words or pictures), which are preceded by prime stimuli (e.g., White and Black faces). If a participant responds faster and/or more accurately to a positive/negative target following a White/Black prime than a negative/positive target

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following a White/Black prime, it is inferred that this participant holds a positive/negative attitude toward White/Black people.

[2] In broad strokes, a parallel can be drawn between our approach and that of the reasoned action theory of Ajzen et al. (2018). They propose that attitudes toward objects can only predict broad classes of behavior and that if researchers want to predict specific behaviors, they should measure outcome values and behavior-outcome expectancies. The reasoned action theory differs from our own theory in that it does not mention the role of stimulus-goal discrepancies and that it treats social norms as a separate determinant of behavior whereas we take these norms to be one type of outcome next to other outcomes.

[3] In an RRT designed to measure beliefs about the intelligence of Black/White people, participants are presented with sentences such as Black people are more intelligent than White people and White people are more intelligent than Black people. In one condition, they are asked to respond as if they believe Black people are smarter than White people whereas in the other condition they are asked to respond as if they believe the opposite proposition. Beliefs are inferred based on the speed/accuracy by which people are able to respond to both conditions.

[4] In the original version of this task, the relation between attitude objects (meat, vegetable food) and five attributes (i.e., specific dimensions of evaluation: health, taste, price, sustainability, and ethicality) was assessed. Participants were presented with pairs of attitude objects and attributes and were asked to switch between an evaluative task in which they had to evaluate the in/congruence of the words in the pair and a nonevaluative task. Influence of the perceived congruence on the non-evaluative task was taken as a measure of the perceived congruence. This task can be adapted to assess (or perhaps simply be reframed as assessing) the relation between behaviors (eating meat, eating vegetable food) and multiple outcomes (good health, good taste, expensive, sustainable, and ethical).

[5] It may be noted that other researchers have already proposed measuring implicit attitudes toward behavior (e.g., eating fruit) rather than implicit attitudes toward objects (e.g., fruit) in order to improve predictions of behavior (e.g., eating fruit) based on the correspondence principle (Irving & Smith, 2020).

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How to cite this article: Moors, A., & Köster, M. (2022). Behavior prediction requires implicit measures of stimulus-goal discrepancies and expected utilities of behavior options rather than of attitudes toward objects. *WIREs Cognitive Science*, *13*(5), e1611. https://doi.org/10.1002/wcs.1611

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